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GB 1274004 US 4415450
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# (54) Root zone plant for the purification of contaminated water

(57) A root zone plant for the purification of contaminated water comprises a mass 3 of a growth culture medium such as soil planted with marsh plants 4. Contaminated water is supplied to the soil 3 through a shingle 5 at one end of the plant and purified water is discharged at the other end through a further shingle filling 6 and a drain pipe 7. The soil is positioned in an upwardly open movable container 1,2 whereby the plant need only be placed in its position of use once the marsh plants have grown to the required size.

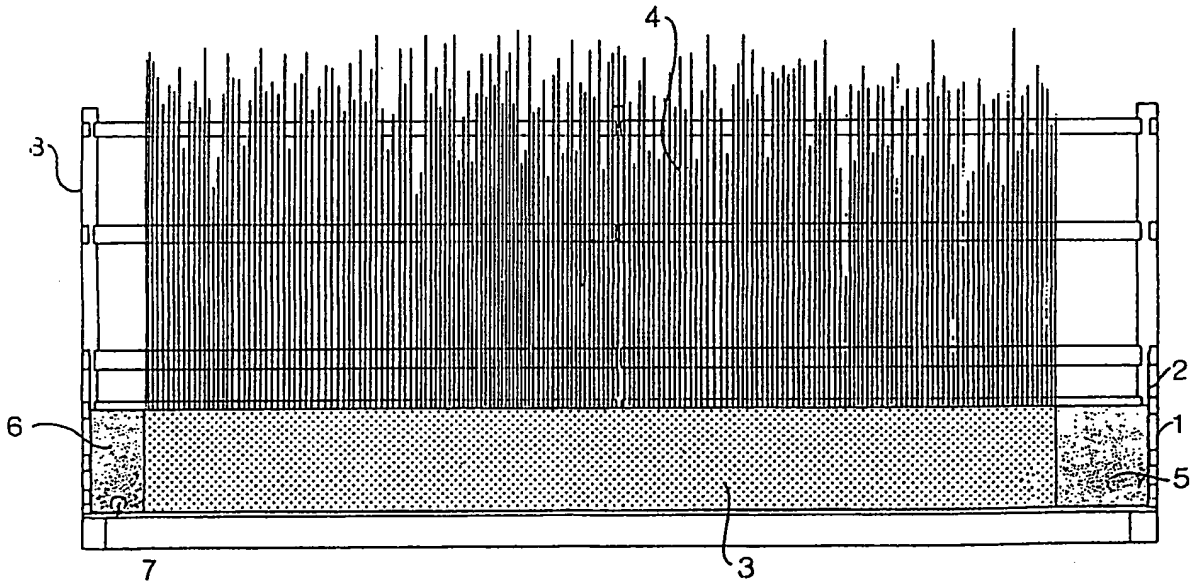


FIG.2



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The drawing(s) originally filed was (were) informal and the print here reproduced is taken from a later filed formal copy.

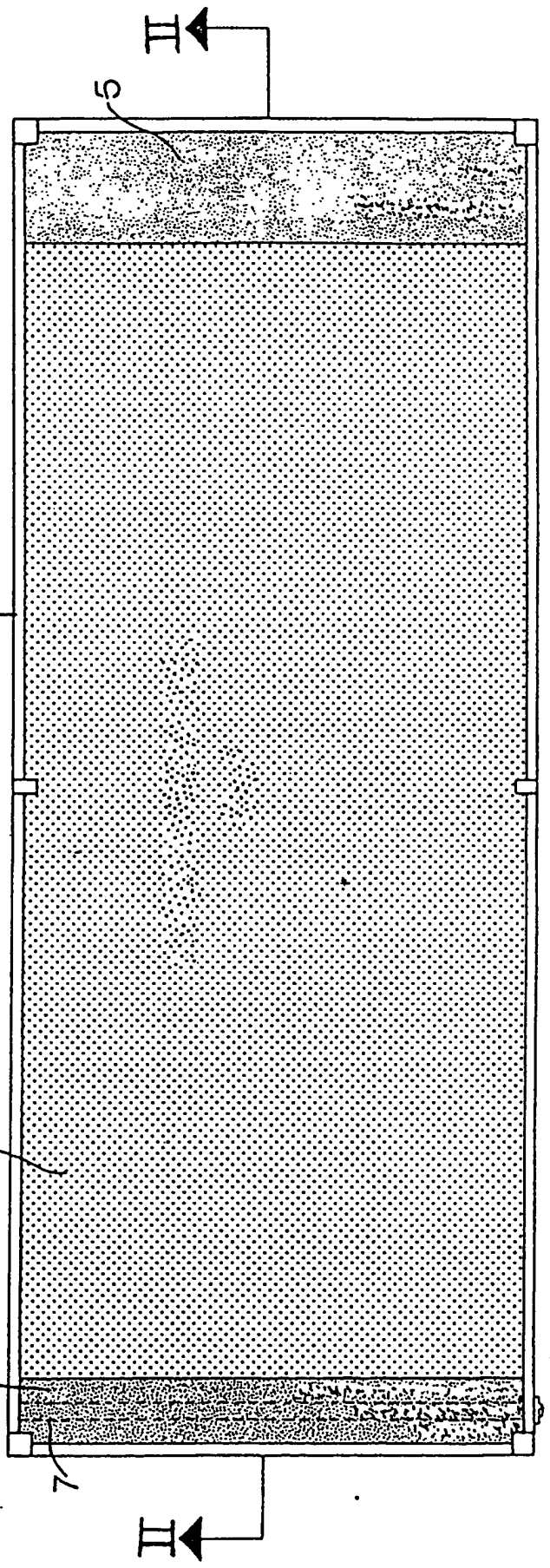


FIG.1

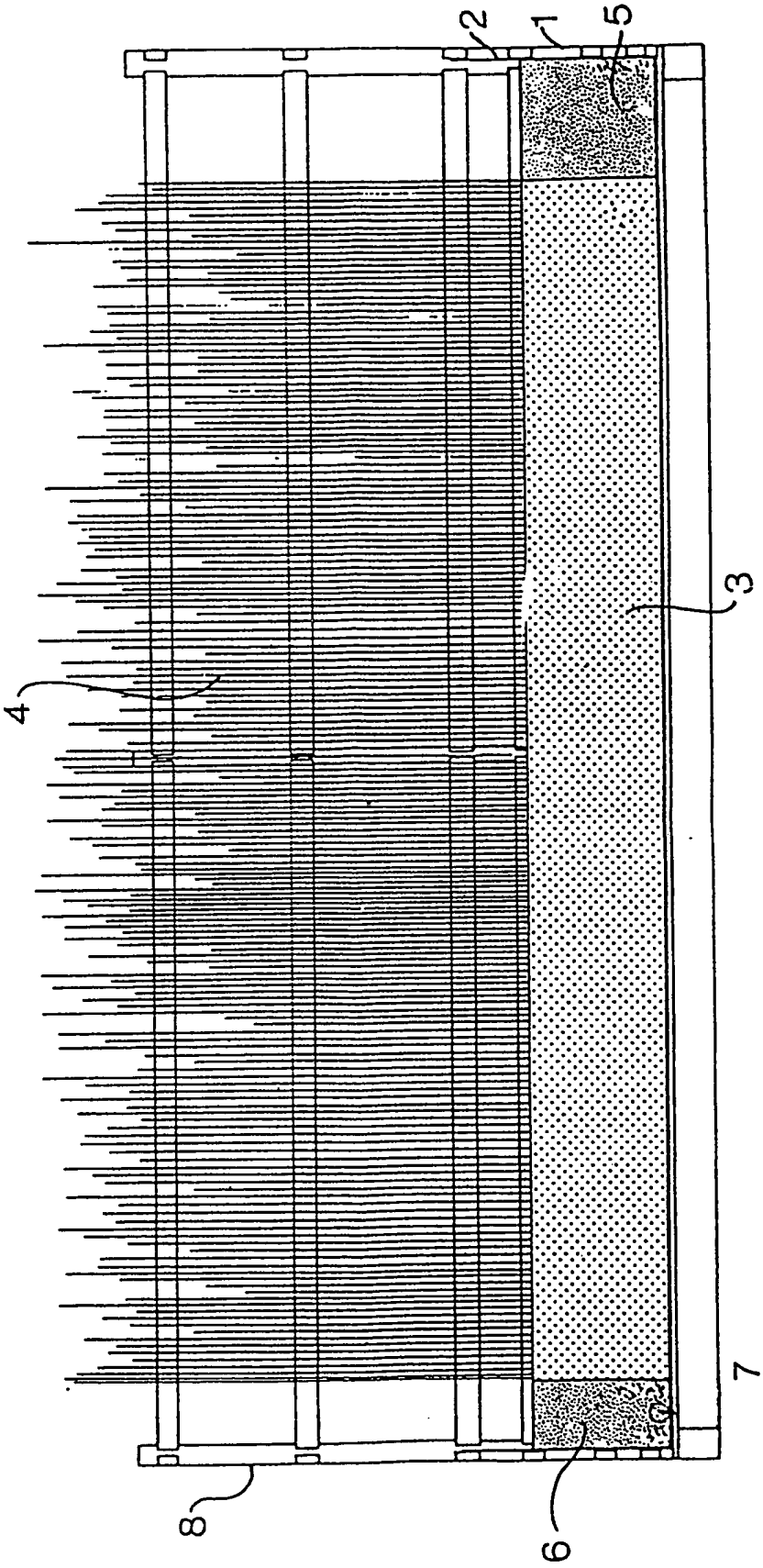


FIG.2

SPECIFICATION

**Root zone plant for the purification of contaminated water**

This invention relates to a root zone plant for the purification of contaminated water comprising a mass of growth culture medium planted with marsh plants such as common reed (Phragmetis communis), rush (Schoenoplectus lacustris), and reed mace (Typha), means for supplying contaminated water to the growth culture medium and means for discharging the purified water therefrom.

During recent years such root zone plants have become widely used for sewage purification.

The water purification obtained by a root zone plant is based on a complicated interaction between the growth culture medium, the root system of the marsh plants, and the micro flora of the growth culture medium.

The micro flora partly consists of aerobic bacteria and partly of facultative anaerobic and obligate anaerobic bacteria. The capability of the bacteria as far as the degradation of the organic matters supplied by the sewage is concerned is determined by the oxygen supply effected by the intercellular oxygen supply system (aerenchym) of the marsh plants conducting air to the root system beneath the water surface.

The growth culture medium also forms part of said interaction by functioning partly as substratum for the root system of the plants and partly as supplier of the different nutritive salts for plants and micro organisms.

A major drawback of the known root zone plants is the considerable time e.g. up to 2 years which elapses from the time of planting to the time of complete functioning of the plant. The reason for this is that the plants require considerable time to develop a ramified root system which is a prerequisite for the effectiveness of the system.

This drawback is eliminated by the root zone plant of the invention, said plant being characterized in that the growth culture medium is placed in an upwards open mobile container.

Using such a container makes it possible to start the establishment of a root zone plant at such a time that the plant is fully functional at the time of delivery. In practice, this may be effected by the planting of the desired plants in such a number of containers with growth culture medium which corresponds to the estimated sale 2-3 years ahead.

The container is preferably a plastic tank or a metal or wooden tank e.g. made from water resistant plywood, which on the inside is coated with a water-proof plastic film e.g. of a thickness of 2 mm. The container which is preferably rectangular and e.g. of a length of about 6 m and a width of 2.4 m is preferably filled with a growth culture medium such as soil up to a height of 60-80 cm.

At the one end the rectangular container preferably comprises a mass of a particulate, inorganic material such as limestone, marble pieces and shingles, and at the opposite end a second mass of an inorganic material. A drain pipe for discharging the purified sewage is preferably provided in the second mass.

Instead of providing such at the ends of the container it may comprise open channels which are separated from the growth culture medium by means of water permeable separation walls e.g. in the form of a perforated plastic film or a woven textile material.

Large or small containers may be used as needed and the containers may be provided with such coupling means that they can be coupled in parallel.

When delivering a plant of the invention the container or containers are transported to the place of use and are there placed on the soil or in specially shaped, optionally cast, holes in the soil.

A special advantage of the root zone plant of the invention is that it causes no pollution because the risk of leakage of contaminated water and thus pollution of the surrounding soil is completely eliminated.

Furthermore, the system may be easily replaced if, for one reason or another, it ceases to function.

Finally, the location of the plant can be freely chosen because no considerations as to special soil conditions have to be taken.

For security reasons a railing is preferably attached to the top of the container.

The plant described is particularly suitable for the purification of sewage. However, it should be understood that it may also be used for the purification of other types of contaminated water e.g. water with an undesired high salt content. Thus, it has proved to be suitable for reducing the contents of salts imparting hardness to the water and other salts such as nitrates, phosphates, and heavy metal salts in ground water.

Also water containing undesirably large amounts of organic material can be purified in a plant of the invention.

The invention will now be described in detail with reference to the drawing wherein

*Figure 1* shows a top view of a root zone plant of the invention and

*Figure 2* shows a sectional view after the line II-II of the root zone plant shown in Figure 1.

In the drawing 1 is a rectangular tank, the inside of which is coated with a water-proof plastic film 2. In the tank 1 there is a soil mass 3 which is planted with marsh plants 4 (Phragmetis communis). At the right end of the tank 1 there is a filling 5 of an inorganic material such as shingles and a similar but smaller filling 6 is placed at the left end of the tank 1. The latter filling 6 is placed over a drain pipe 7.

The plant shown furthermore comprises a railing 8 encircling the top of the tank 1.

When using the plant of the invention contaminated water e.g. sewage is introduced into the filling 5 from where it penetrates into the soil mass 3 and moves towards the filling 6 and the drain pipe 7 placed therein.

During the passage through the soil mass 3 the sewage is purified to such an extent that it can be passed into natural reciplents through the drain pipe 7 or it may be used as fresh water without further purification.

CLAIMS

1. A root zone plant for the purification of con-

taminated water comprising a mass (3) of a growth culture medium planted with marsh plants (4), means (5) for supplying contaminated water to the growth culture medium (3), and means (6, 7) for discharging purified water therefrom *characterized* in that the growth culture medium is placed in an upwards open mobile container (1, 2).

2. A root zone plant as in claim 1 *characterized* in that the container (1, 2) is of a rectangular shape and comprises at the one end a filling (5) of a particulate, inorganic material for distributing the sewage in the growth culture medium (3) and at the opposite end a second filling (6) of a particulate, inorganic material for discharging the purified water.

3. A root zone plant as in claim 2 *characterized* in that a drain pipe (7) for discharging purified water is mounted in the second filling (6).

4. A root zone plant as in claim 1 *characterized* in that the container is of a metal or wooden tank (1) the inside of which is coated with a water-proof plastic film (2).

5. A root zone plant for the purification of contaminated water substantially as specifically herein described with reference to the accompanying drawings.

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